

REMARKS/ARGUMENTS

In response to the Office Action dated October 5, 2005, Claims 1-26 remain in this application. The claims have not been amended.

Claims 1-26 were rejected under 35 USC 103(a).

Claims 1-26 were rejected under obviousness-type double patenting.

Claim Rejections - 35 USC § 103

First Rejection: Claims 1-4, 6-16, and 18-26 are rejected under 35 USC 103(a) as being unpatentable over U.S. Patent No. 6,321,134 (Henley et al.) in view of U.S. Patent Application Pub. No. 2003/0029567 (Dhindsa et al.).

Henley clearly discloses an inductively coupled plasma reactor, as the "inductive cells" 446 of FIG. 4 of Henley are his means of applying plasma source power. The plasma of Henley's reactor is generated by inductively coupled power. Dhindsa discloses a capacitively coupled reactor, which must be operated at a relatively high chamber pressure (e.g., 10 mT to 100 mT), and has nothing to do with plasma immersion ion implantation. Dhindsa's reactor is for plasma etch or plasma CVD processes, and therefore its cathode electrode need be capable of withstanding only very low RF bias voltages, e.g., hundreds of volts for example. It does not appear Dhindsa's reactor is capable of applying higher bias voltages corresponding to a reasonable implantation depth --e.g., 500 kV to 10 kV-- without arcing. This is because Dhindsa lacks high voltage bias electrode features such as those disclosed in applicants' FIGS. 97 and 98, for example. Thus, Dhindsa is unsuited for plasma immersion ion implantation. Since Henley apparently does not teach applying plasma bias power in his inductively coupled reactor, there are no teachings in Henley to compensate for this failing of Dhindsa.

Therefore, the skilled worker would not look to a combination of Henley and Dhindsa to perform ion implantation.

More importantly, the teachings of Henley, directed to an inductively coupled reactor, cannot be combined with the teachings of Dhindsa, directed to a capacitively coupled reactor.

An inductively coupled plasma reactor produces a very high density plasma and must be operated at very low chamber pressure (e.g., 0.5 mT), while a capacitively coupled plasma reactor produces a lower density plasma and must be operated at a high chamber pressure (10 mT to hundreds of mT). The Examiner's attention is drawn to Table 1.1 at page 16 of Lieberman et al., *Principles of Plasma Discharges and Materials Processing*, a copy of which is attached for the Examiner's convenience. Note in Table 1.1 that capacitively coupled plasmas must be operated above 10 mT in general, while inductively coupled plasmas must be held at a low pressure such as 1 mT or 0.5 mT. Thus, it is highly unlikely that any skilled worker would believe Henley has anything whatsoever to do with a capacitively coupled plasma. The plasma of Henley cannot be maintained at such low chamber pressures without inductive coupling or other high density source, and therefore Henley cannot support a capacitively coupled plasma. Therefore, in order for Henley to adopt the teachings of Dhindsa, Henley would have to change his operating regime.

Henley's inductively coupled high density plasma apparently needs no bias power to perform ion implantation. This may not be the case if Dhindsa's teachings are adopted into Henley's reactor (for example, by substituting a capacitively coupled source in place of the inductively coupled source as the rejection suggests). It is unclear, for example, whether changing Henley's inductively coupled source to a capacitively coupled source would require the further addition a bias power source to Henley in order to render it capable of ion implantation, or whether

Henley's apparatus would need to be operated in a different pressure regime to at least render it capable of simply sustaining any plasma. If such a modification of Henley would not be capable of plasma immersion ion implantation without the addition of a bias power source, then it would fail because there are no teachings in Dhindsa regarding a bias power electrode capable of sustaining high bias voltages (sufficient for ion implantation) without arcing. Thus, the modification of Henley proposed by the Examiner would appear to risk rendering Henley incapable of ion implantation.

In summary, there can be no motive to combine the teachings of Dhindsa into Henley, because doing so could render Henley incapable of performing plasma immersion ion implantation. Moreover, it is unclear how the modification is to be made without rendering Henley incapable of even sustaining a plasma, since the operating regimes of Henley and Dhindsa appear to be mutually exclusive, in view of the fact that one is an inductively coupled reactor and the other is a capacitively coupled reactor. Also, while the unmodified version of Henley apparently needs no bias power to perform implantation, it is unclear whether modifying Henley in the manner suggested by the rejection would render Henley incapable of ion implantation without a bias power source. The disclosure of Dhindsa does not appear to enable the application of bias power sufficient to achieve ion implantation, because of its lack of features such as those of Applicants' FIGS. 97 and 98. Finally, there is no evidence to suggest that Henley needs any improving or modification whatsoever, and so there is no motive to modify Henley in any way, and certainly no motive to modify it in the manner suggested in the rejection. Thus, it would appear that the combination of Henley with Dhindsa is motivated only by the impermissible hindsight of applicants' invention.

In summary, Henley and Dhindsa are completely unrelated

references, and there can be no motivation for combining them in any manner. Therefore the rejection is respectfully traversed for failure to make out a *prima facie* case of obviousness. Reconsideration of the rejection of Claims 1-4, 6-16 and 18-26 under 35 USC 103 is respectfully requested based upon the claim language of Claim 1, "a plasma immersion ion implantation reactor comprising an RF source power applicator coupled across said ceiling or said sidewall and said wafer support pedestal for capacitively coupling RF source power into said process zone, . . . and . . . "an RF bias generator having an RF bias frequency and coupled to said workpiece support pedestal". Claims 2-4, 6-16 and 18-26 contain the same limitations and are therefore patentable upon the same basis.

Second Rejection: Claim 5 is rejected under 35 USC 103(a) as being unpatentable over Henley et al. in view of Dhindsa et al. and further in view of U.S. Patent No. 6,643,557 (Miller et al.).

The combination of Henley and Dhindsa does not suggest the elements of Claim 1, and therefore their combination with Miller cannot suggest the elements of Claim 5 which contains all the elements of Claim 1. Therefore, reconsideration of the rejection of Claim 5 is requested upon the basis discussed above with reference to Claim 1.

Third Rejection: Claim 17 is rejected under 35 USC 103(a) as being unpatentable over Henley et al. in view of Dhindsa et al. and further in view of U.S. Patent No. 4,579,618 (Celestino et al.).

The combination of Henley and Dhindsa does not suggest the elements of Claim 1, and therefore their combination with Celestino cannot suggest the elements of Claim 17 which contains all the elements of Claim 1. Therefore, reconsideration of the

rejection of Claim 17 is requested upon the basis discussed above with reference to Claim 1.

Double Patenting

Claims 1-26 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting rejection as being unpatentable over claims 1-4, 52-58, 70, 73, 74, 79, 81-83, 86 and 87 of co-pending Application No. 10/646,612.

Applicants submit herewith a Terminal Disclaimer to obviate the double patenting rejection over co-pending Application No. 10/646,612.

Claims 1-4 and 6-26 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-8, 31-33, 57 and 58 of co-pending Application No. 10/646,532.

Applicants submit herewith a Terminal Disclaimer to obviate the double patenting rejection over co-pending Application No. 10/646,532.

Claim 5 is provisionally rejected under the judicially create doctrine of obviousness-type double patenting as being unpatentable over claim 1 of co-pending Application No. 10/646,528.

Applicants submit herewith a Terminal Disclaimer to obviate the double patenting rejection over co-pending Application No. 10/646,528.

SUMMARY

In view of the foregoing remarks, it is felt that the rejection of the claims under 35 USC 103(a) and double-patenting have been overcome. Therefore, withdrawal of these rejections is

respectfully requested and allowance of the application is earnestly solicited.

If, However, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, the Examiner should telephone Robert Wallace at (805) 644-4035 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,



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